REMARKS

Claims 1, 3, 9, 10, 18 and 19 have been amended. Claims 1-26 remain pending in the application. Reconsideration is respectfully requested in light of the following remarks.

Objection to the Specification:

The Examiner objected to the title of the invention as insufficiently descriptive. Accordingly, Applicants have amended the title and request that the objection be withdrawn.

Section 103(a) Rejection:

The Examiner rejected claims 1-26 under 35 U.S.C. § 103(a) as being unpatentable over Witt et al. (U.S. Patent 6,256,728) (hereinafter, "Witt") in view of Rotenberg, et al. ("Trace Cache: a Low Latency Approach to High Bandwidth Instruction Fetching") (hereinafter, "Rotenberg"). Applicants respectfully traverse this rejection for at least the following reasons.

Neither Witt nor Rotenberg, separately or in combination, teach or suggest all of the features of Applicants' claim 1. Specifically, the cited references do not teach or suggest a method comprising predicting an execution path of a first conditional branch operation stored in an entry of a trace cache; in response to predicting said execution path, if a first operation stored in said entry of said trace cache is not in said execution path according to said prediction, dispatching said first operation to a scheduler and assigning to said first operation a non-executable status indicative that said first operation is not in said execution path, wherein assigning said non-executable status comprises marking said first operation as non-executable; detecting that said prediction is incorrect subsequent to assigning said non-executable status to said first operation; assigning an executable status to said first operation in response to said detecting, wherein said

executable status is indicative that said first operation is in said execution path, and wherein assigning said executable status comprises marking said first operation as executable without refetching said first operation from said trace cache.

Witt generally discloses a technique in which a branch instruction within a run of fetched instructions is predicted, and instructions subsequent to the branch instruction are selectively canceled dependent upon the result of the branch prediction (Abstract and col. 5, lines 1-23). For example, for a predicted-taken forward branch, Witt discloses that instructions between the predicted branch and its target may be canceled, while the instructions corresponding to and following the branch target may be retained (Fig. 6, col 24, line 45 – col. 25, line 17). For a predicted-taken backward branch, Witt discloses that all instructions within the run subsequent to the predicted branch may be canceled (Fig. 5, col. 23, line 50 – col. 24, line 44).

However, while Witt discusses the update of a branch prediction in the event of a branch misprediction (col. 15, line 60 – col. 16, line 16), Witt makes no provision whatsoever for changing the execution status of an operation that was determined in response to the branch prediction upon determining that the prediction was incorrect, as is required by claim 1. That is, according to Witt, once a branch prediction is made, certain instructions may be canceled dependent upon the prediction. Witt describes the cancellation of instructions as "invalidating the instructions within the pipeline subsequent to fetching the instructions. For example, the instructions may be invalidated within instruction queue 20. The term 'squashing instructions' may also be used herein to refer to canceling the instructions." (col. 5, lines 54-59) Witt does not disclose that, once canceled or invalidated as a result of a branch prediction, an instruction can in any way be assigned an executable status without being refetched. Indeed, as is commonly understood in the microprocessor arts, once an instruction is canceled, squashed or flushed, it ceases to exist as a meaningful entity within the processor pipeline and must be refetched and reissued if its cancellation was in error.

Applicants submit that claim 1 as originally submitted is distinguishable over the cited references. However, to clarify its specific distinctions, Applicants have amended claim 1 to recite that the first operation is <u>dispatched to a scheduler</u> in response to determining that the first operation is not in the predicted execution path, that <u>assigning the non-executable status comprises marking the first operation as non-executable</u>, and that <u>assigning the executable status in response to detecting that the prediction is incorrect comprises marking said first operation as executable without refetching said first operation from said trace cache</u>. Neither Witt nor Rotenberg teach or suggest such a transition of executable status information for an operation that has been dispatched without refetching the operation.

Applicants note that at col. 5, lines 23-31, Witt discloses the "retaining [of] *target instructions* which are fetched concurrently with the branch instruction having the forward branch target address." (emphasis added). However, this refers to the <u>instructions which, by virtue of being associated with the target of a branch instruction, are in the predicted execution path of that branch instruction</u>. It is these instructions which, according to Witt, are retained without being fetched again. However, as described previously, Witt <u>cancels instructions that are not in the predicted execution path</u> and <u>does not describe how such canceled instructions may be reissued without being refetched in the event the prediction is incorrect.</u> It is the alteration of the executable status without refetching of operations that depend on <u>incorrectly predicted</u> branches that claim 1 recites, and this is not disclosed by any combination of Witt and Rotenberg.

Therefore, Applicants submit that claim 1 is patentably distinguishable over the cited references, as are independent claims 9 and 18, which recite limitations similar to claim 1. Applicants further note that numerous ones of the dependent claims recite additional distinctions over the cited references. However, since the independent claims have been shown to be distinguishable, no further discussion of the dependent claims is necessary at this time.
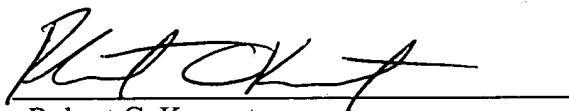
CONCLUSION

Applicants submit the application is in condition for allowance, and prompt notice to that effect is respectfully requested.

If any extension of time (under 37 C.F.R. § 1.136) is necessary to prevent the above-referenced application from becoming abandoned, Applicants hereby petition for such an extension. If any fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 501505/5500-92000/RCK.

Also enclosed herewith are the following items:

☒ Return Receipt Postcard

☐ Petition for Extension of Time

☐ Notice of Change of Address

☐ Other:

Respectfully submitted,

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